

Advancing Launch Readiness of the Europa Light Microscope

The search for life in our solar system relies on our ability to measure key biomarkers *in situ* and identify them as likely of biotic origin. One class of biomarkers that would be indicative of life is cell-like features such as the colocalization of key biochemicals, spatial organization of native UV fluorescent compounds, and polarization across membrane compartments. The Europa Lander Science Definition Team has emphasized the need for a light microscope to search for these features on Europa, and the Europa Light Microscope (ELM) has been developed to address this need. This work presents the development towards high launch readiness of ELM by demonstrating its optical resolution under brightfield illumination, deep UV fluorescence imaging of unstained living samples, and multicolor imaging of samples stained with exogenous fluorophores targeting proteins, lipids, and nucleic acids. This work also seeks to extend the capabilities of ELM by incorporating fluorescence-based assays for membrane potential as a key biomarker for living cellular material.